

DISCLOSURE OF THE ABSTRACT

It is an object of the present invention to reduce the constraint that the density ratio is constant as small as possible, and to obtain high power recovering effect in a wide operation range by using an expander which is operated in accordance with a flowing direction of refrigerant. An expander used in a refrigeration cycle uses carbon dioxide as refrigerant and has a compressor, an outdoor heat exchanger and an indoor heat exchanger. The expander comprises a cylindrical cylinder, a rotor which rotates in the cylinder, a vane which divides an expansion space formed between an inner peripheral surface of the cylinder and an outer peripheral surface of the rotor into a plurality of spaces, and a vane groove provided in the rotor for accommodating the vane therein. The vane groove is provided with a back pressure chamber which pushes the vane against the inner peripheral surface of the cylinder, and the refrigerant in the supercritical state is introduced into the back pressure chamber.